# THE WEATHER OF THE MONTH.

By Mr. WM. B. STOCKMAN, Chief of the Division of Meteorological Records.

## PRESSURE.

The distribution of mean atmospheric pressure is graphically shown on Chart VI and the average values and departures from normal are shown in Tables I and V.

The contours of the isobars of mean barometric pressure for the month over the Rocky Mountain and Pacific regions closely approached the normal, while over the southeastern portion of the country they differed considerably therefrom.

Areas of high pressure overlay the middle and southern Plateau and slope districts and the region from Virginia and southern New Jersey southwestward to the central portion of the Texas coast. The crest of mean high barometer overlay the southern portion of Idaho, from which section average pressures of about 30.25 inches were reported.

The mean barometer was lowest over the extreme northwestern coast of Washington, where a minimum mean pressure of 29.95 inches occurred.

The mean pressure was above the normal for the month in the Atlantic States as far south as central North Carolina, in the eastern portions of Tennessee and Kentucky, West Virginia, southeastern Ohio, Louisiana, Texas, the middle and southern slope and Plateau regions, and California, except the extreme northwestern portion; elsewhere it was below the normal.

The greatest positive departures ranged from +.05 to +.14 inch, and occurred over New England, the western portions of the southern and middle slope regions, the middle and southern Plateau regions, and southeastern California; the maximum excess being reported from central and western New Mexico, extreme western Colorado, and southwestern Wyoming.

The greatest negative departures ranged from —.05 to —.10 inch, and occurred over the greater portions of the upper Lake region, upper Mississippi and Missouri valleys, and eastern and northern North Dakota, the maximum deficiency being reported from northwestern Iowa and extreme southeastern South Dakota.

The mean pressure for the month exceeded that of December in the Atlantic districts, southern portion of the east Gulf and extreme southeastern portion of the west Gulf States, and northern North Dakota; and diminished from the preceding month in the remaining districts. The greatest increases were but +.05 to +.08 inch, and occurred over eastern and southern New England and southern Florida. The decreases were much more marked both in extent of territory covered and amount, ranging from —.05 to —.14 inch over the district from southern Lake Michigan, Illinois, northwestern Arkansas, and north-central Texas, westward to the Pacific coast at about latitude 36° and to the northward thereof, and northwestward over north-central Montana.

## TEMPERATURE OF THE AIR.

The mean temperature for the month was below the normal in southern and extreme western Florida, the Rio Grande Valley, the extreme western parts of New Mexico and Colorado, southwestern Wyoming, Utah, except the extreme northwestern portion, eastern Nevada, and northern Arizona; in the remaining sections of the country the mean temperature was above the normal.

The negative departures were small and in no case exceeded —2°, while the positive departures were very marked, exceeding +4° over the greater portion of the area; +6°, or more, over the region north of a line drawn from southern New Jersey southwestward to east-central New Mexico and eastward of a line drawn from this point generally northwestward over eastern Washington; +8°, or more, northward of a line run from east-central New York to northeastern New Mexico and eastward of a line from that point trending generally northwestward over western Montana; +10°, or more, in east-central southern Michigan, western Minnesota, eastern North Dakota, western and southern Montana, South Dakota, except the central portion, Nebraska, and northern and western Kansas; and +12° to +14° in western Minnesota, northeastern South Dakota, and southeastern Montana.

The mean temperature was above the normal in all geographic districts.

The isotherm of 60° of mean temperature crosses Florida about latitude 29°; 50° touches the coast of central North Carolina, then trends a little to the southwestward from the Atlantic coast, at about latitude 33°, to the Rio Grande Valley in latitude 30°, and northwestward from south-central Arizona to the Pacific coast about latitude 49°; 40° trends in a general southwestward direction from central Delaware to south-central New Mexico, thence northwestward to central California about latitude 42°, thence northward to the Canadian boundary; 30° from the northern boundary of Massachusetts westward over central Lower Michigan, thence southwestward to northwestern Missouri, thence somewhat to the north of west to meridian 105°, when it takes a sharp bend to the southward into central New Mexico, thence generally westward to central Arizona about latitude 35°, thence somewhat to the northeastward into southern Utah, thence westward into north-central California, northward to the western part of central Oregon, northeastward to west-central Idaho, recurving westward to east-central Washington, thence northward to the boundary at meridian 121°, also small portions of southwestern South Dakota and southwestern Idaho are within the isotherm of 30°; 20° trends westward from the eastern boundary of Maine about latitude 46°, to the extreme western part of Lake Superior, thence southward to northeastern Iowa, westward to longitude 100° at the southern boundary of South Dakota, and thence northwestward to the boundary about longitude 114°; portions of western Wyoming and northern Colorado and the northeastern portion of Utah and southeastern Idaho are inclosed by the isotherm of 20°. Portions of northwestern Minnesota and northeastern North Dakota are within the area of 10°, or less, of mean temperature.

Maximum temperatures of 80°, or higher, occurred in extreme southeastern Georgia, the Peninsula of Florida, the lower and central parts of the Rio Grande Valley and central Texas, and in portions of southwestern California; of 70° to 80° in the region eastward of meridian 101° and southward of parallel 40°, except in the mountain regions of Georgia, eastern Tennessee, western North Carolina, western Virginia, and western Maryland, also in western Pennsylvania, extreme western New York, Ohio, upper Rio Grande Valley, southeastern New Mexico, southern and western Arizona, and southwestern and the interior of extreme northern California; of 60° to 70° in the Alleghany regions from northwestern Georgia northeastward, in the interior of New Jersey, Connecticut, Rhode Island, and Massachusetts, southwestern Maine, southern parts of New Hampshire and Vermont, northern portions of Indiana and Illinois, extreme southeastern Wisconsin, southeastern Iowa, Nebraska, except the extreme northeastern portion, southwestern South Dakota, southeastern Wyoming, eastern Colorado, extreme northwestern Texas, eastern and southern New Mexico, southern and western Arizona, northern and eastern California, extreme western Oregon, and in portions of western Montana; 50° to 60° in central Lower Michigan, extreme southern Wisconsin, Iowa, except the extreme southeastern and north-central portions, South Dakota, except

the southwestern and northeastern portions, southwestern North Dakota, Montana, except the extreme northeastern and northwestern portions, central Idaho, western and southern Washington, northern and central Oregon, central Nevada, southern, central, and north-central Utah, northeastern Arizona, northwestern Mew Mexico, southwestern Colorado, and eastern Wyoming, except the extreme southeastern part; of 40° to 50° from central Maine, northern Lower Michigan, Upper Michigan, Wisconsin, except the extreme southern part, Minnesota, except the extreme northwestern part, southeastern and northwestern North Dakota, extreme northeastern and northwestern Montana, northeastern Washington, northwestern Colorado, northern Utah, except the central portion, western Wyoming, southern Idaho, southeastern Oregon, and northern Nevada; and of less than 40° from northwestern Minnesota, and northeastern North Dakota.

Minimum temperatures below the freezing point occurred everywhere, except over the greater portion of the Peninsula of Florida and portions of the central coast of Texas, and the southwestern and central coasts of California; of zero or lower in the northern portions of Maine, New Hampshire, and Vermont, western Massachusetts, interior New York, western Upper Michigan, central and western Wisconsin, Iowa, except the eastern part, northwestern Missouri, Nebraska, except the south-central part, Colorado, northwestern New Mexico, northeastern Arizona, Nevada, extreme east-central California, southeastern Oregon, northeastern Washington, Idaho, except the southwestern portion, Montana, the Dakotas, Minnesota, Wyoming, and Utah, except the northwestern portion; —10° to —20° from the northern portions of Maine and Vermont, northwestern Wisconsin, Minnesota, north-central and extreme northwestern Iowa, northern Nebraska, the Dakotas, Montana, central and eastern Idaho, Wyoming, except southeastern portion, western Colorado, and portions of southeastern Utah, west central New Mexico, central Arizona, and northeastern Nevada; —20° to —30°, west-central Wisconsin, northern Minnesota, northeastern South Dakota, North Dakota, except south-central part, northeastern and north-central Montana, south-central Idaho, and central Arizona; and —30 from portions of northwestern Minnesota, southeastern North Dakota, and northeastern Montana.

The average temperatures for the several geographic districts and the departures from the normal values are shown in the following table:

*Average temperatures and departures from normal.*

| Districts. | Number of stations. | Average temperatures for the current month. | Departures for the current month. | Accumulated departures since January 1. | Average departures since January 1. |
|---|---|---|---|---|---|
| | | ° | ° | ° | ° |
| New England | 9 | 31.7 | + 6.7 | | |
| Middle Atlantic | 13 | 38.9 | + 6.4 | | |
| South Atlantic | 10 | 48.8 | + 2.8 | | |
| Florida Peninsula* | 8 | 60.6 | + 0.8 | | |
| East Gulf | 8 | 49.2 | + 0.8 | | |
| West Gulf | 7 | 49.5 | + 2.9 | | |
| Ohio Valley and Tennessee | 12 | 39.6 | + 5.8 | | |
| Lower Lake | 8 | 34.0 | + 8.7 | | |
| Upper Lake | 10 | 26.8 | + 8.7 | | |
| North Dakota* | 8 | 12.4 | + 7.4 | | |
| Upper Mississippi Valley | 13 | 27.8 | + 7.5 | | |
| Missouri Valley | 11 | 29.1 | + 8.8 | | |
| Northern Slope | 7 | 26.1 | + 8.6 | | |
| Middle Slope | 6 | 36.6 | + 7.6 | | |
| Southern Slope* | 6 | 41.3 | + 3.2 | | |
| Southern Plateau* | 13 | 39.0 | + 1.5 | | |
| Middle Plateau* | 8 | 25.0 | + 0.2 | | |
| Northern Plateau* | 12 | 29.7 | + 4.4 | | |
| North Pacific | 7 | 42.3 | + 3.1 | | |
| Middle Pacific | 5 | 49.8 | + 2.7 | | |
| South Pacific | 4 | 53.1 | + 2.6 | | |

* Regular Weather Bureau and selected cooperative stations.

*In Canada.*—Prof. R. F. Stupart says:

Temperatures below the average were reported from Yukon Territory and the extreme northern districts of British Columbia, but in all other portions of Canada the normal was exceeded, and in many localities to a very marked extent. In the Northwest Provinces the departure ranged from 4° to 12°, in Ontario from 7° to 10°, in Quebec from 7° to 9°, and in the Maritime Provinces from 3° to 9°.

## PRECIPITATION.

The distribution of total monthly precipitation is shown on Chart IV.

The precipitation for the month was above the normal in southwestern Virginia, western North Carolina, South Carolina, Georgia, except the extreme northwestern part, Florida, except the extreme southeastern and western portions, northern Arkansas, Missouri, Illinois generally, northern Lower Michigan, Upper Michigan, Wisconsin, eastern and central Iowa, Minnesota, North Dakota, west-central Wyoming, southeastern Idaho, Nevada, California generally, and portions of northwestern Washington; elsewhere it was below normal. The greatest excesses ranged from + 2.3 to + 2.8 inches, and occurred in extreme western North Carolina, north-central Upper Michigan, northwestern Arkansas, and the east-central part of northern California. The greatest deficiencies ranged from — 2.0 to — 3.0 inches and were reported from southeastern Tennessee, northeastern Alabama, southwestern Louisiana, southeastern Texas, extreme northwestern Pennsylvania, and extreme northwestern Washington.

By geographic districts the precipitation for the month was normal in the South Atlantic States and middle Pacific region; above normal in the Florida Peninsula, upper Lake region, North Dakota, upper Mississippi and Missouri valleys, and the middle Plateau and south Pacific regions.

The total depth and the southern limit of snowfall are depicted on Chart VII, and the depth of snow on ground at end of month on Chart VIII.

*Average precipitation and departure from the normal.*

| Districts. | Number of stations. | Average. | | Departure. | |
|---|---|---|---|---|---|
| | | Current month. | Percentage of normal. | Current month. | Accumulated since Jan. 1. |
| | | *Inches.* | | *Inches.* | *Inches.* |
| New England | 9 | 2.89 | 74 | —1.0 | |
| Middle Atlantic | 13 | 2.64 | 75 | —0.9 | |
| South Atlantic | 10 | 4.16 | 100 | 0.0 | |
| Florida Peninsula* | 8 | 4.06 | 137 | +1.1 | |
| East Gulf | 8 | 4.09 | 77 | —1.2 | |
| West Gulf | 7 | 2.29 | 66 | —1.2 | |
| Ohio Valley and Tennessee | 12 | 3.02 | 72 | —1.2 | |
| Lower Lake | 8 | 1.54 | 58 | —1.1 | |
| Upper Lake | 10 | 2.76 | 124 | +0.7 | |
| North Dakota* | 8 | 0.84 | 156 | +0.3 | |
| Upper Mississippi Valley | 13 | 2.59 | 153 | +0.9 | |
| Missouri Valley | 11 | 1.24 | 119 | +0.2 | |
| Northern Slope | 7 | 0.36 | 55 | —0.3 | |
| Middle Slope | 6 | 0.46 | 61 | —0.3 | |
| Southern Slope* | 6 | 0.55 | 65 | —0.3 | |
| Southern Plateau* | 13 | 0.69 | 70 | —0.3 | |
| Middle Plateau* | 8 | 1.70 | 170 | +0.7 | |
| Northern Plateau* | 12 | 1.75 | 90 | —0.2 | |
| North Pacific | 7 | 6.31 | 84 | —1.2 | |
| Middle Pacific | 5 | 5.41 | 100 | 0.0 | |
| South Pacific | 4 | 3.31 | 122 | +0.6 | |

* Regular Weather Bureau and selected cooperative stations.

*In Canada.*—Professor Stupart says:

Precipitation was deficient in most parts of Canada, except in northern, and locally in southern, parts of British Columbia, the eastern portion of Saskatchewan, in Manitoba, and in a few scattered localities in Ontario.

The depth of snow on the ground at the end of the month varied very much with the district. In the Cariboo district of British Columbia 18 inches were reported. In the Northwest Provinces the ground was practically bare in southwest districts, while there was a covering of from 3 to 9 inches elsewhere. In New Ontario the depth varied from 1 to 14 inches, while over the remainder of the province there was practically no snow in evidence. A depth of from 13 to 21 inches existed in Quebec and about 12 inches in northern New Brunswick, and over the southern portion of New Brunswick, Nova Scotia, and Prince Edward Island there was no snow.

## WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

*Maximum wind velocities.*

| Stations. | Date. | Velocity. | Direction. | Stations. | Date. | Velocity. | Direction. |
|---|---|---|---|---|---|---|---|
| Atlanta, Ga | 21 | 50 | se. | Mount Weather, Va | 16 | 56 | nw. |
| Block Island, R. I | 6 | 51 | w. | Do | 17 | 60 | nw. |
| Do | 13 | 54 | ne. | Do | 23 | 56 | nw. |
| Do | 14 | 54 | ne. | Do | 24 | 58 | nw. |
| Buffalo, N. Y | 4 | 50 | w. | Nantucket, Mass | 13 | 58 | ne. |
| Do | 15 | 60 | sw. | Do | 14 | 67 | ne. |
| Do | 16 | 67 | sw. | New York, N. Y | 6 | 61 | w. |
| Do | 23 | 57 | sw. | North Head, Wash | 7 | 54 | se. |
| Cairo, Ill | 3 | 52 | sw. | Do | 12 | 54 | s. |
| Cape Henry, Va | 9 | 50 | nw. | Do | 16 | 60 | s. |
| Do | 12 | 52 | n. | Do | 21 | 60 | s. |
| Do | 13 | 54 | n. | Do | 22 | 60 | se. |
| Do | 26 | 50 | ne. | Do | 23 | 72 | s. |
| Chicago, Ill | 3 | 56 | sw. | Do | 24 | 66 | se. |
| Cleveland, Ohio | 6 | 54 | sw. | Oklahoma, Okla | 21 | 58 | n. |
| Do | 15 | 50 | sw. | Do | 22 | 60 | nw. |
| Columbus, Ohio | 6 | 50 | sw. | Peoria, Ill | 3 | 53 | s. |
| Do | 15 | 56 | sw. | Pittsburg, Pa | 6 | 51 | w. |
| Do | 16 | 52 | sw. | Do | 15 | 66 | w. |
| Detroit, Mich | 15 | 52 | sw. | Do | 16 | 52 | w. |
| Do | 16 | 50 | sw. | Point Reyes Light, Cal | 11 | 59 | s. |
| Duluth, Minn | 5 | 50 | w. | Do | 12 | 67 | sw. |
| Do | 30 | 54 | nw. | Do | 13 | 57 | sw. |
| Eastport, Me | 4 | 52 | se. | Do | 15 | 53 | s. |
| Do | 16 | 63 | se. | Do | 16 | 74 | s. |
| Evansville, Ind | 15 | 50 | s. | Do | 17 | 51 | sw. |
| Grand Haven, Mich | 4 | 51 | sw. | Do | 18 | 70 | s. |
| Do | 6 | 54 | w. | Do | 19 | 61 | nw. |
| Do | 16 | 50 | w. | Reno, Nev | 16 | 58 | sw. |
| Keokuk, Iowa | 3 | 50 | sw. | Richmond, Va | 4 | 51 | s. |
| Lexington, Ky | 15 | 50 | s. | St. Louis, Mo | 15 | 50 | sw. |
| Little Rock, Ark | 21 | 50 | nw. | Southeast Farallon, Cal | 11 | 54 | s. |
| Mount Tamalpais, Cal | 1 | 50 | n. | Do | 16 | 55 | s. |
| Do | 12 | 61 | sw. | Do | 18 | 54 | s. |
| Do | 13 | 61 | sw. | Syracuse, N. Y | 15 | 58 | s. |
| Do | 15 | 58 | sw. | Do | 16 | 57 | s. |
| Do | 16 | 60 | sw. | Tatoosh Island, Wash | 4 | 54 | s. |
| Do | 17 | 54 | s. | Do | 7 | 50 | sw. |
| Do | 18 | 62 | nw. | Do | 10 | 64 | e. |
| Do | 19 | 75 | nw. | Do | 11 | 85 | e. |
| Mount Weather, Va | 6 | 65 | nw. | Do | 23 | 54 | s. |
| Do | 9 | 52 | nw. | Do | 31 | 54 | e. |

## HUMIDITY.

The average relative humidity for the month was normal in New England and the upper Lake region; below normal in the Middle Atlantic and Gulf States, Ohio Valley and Tennessee, lower Lake region, and the middle and southern slope and middle and southern Pacific regions; elsewhere it was above the normal.

The averages by districts appear in the following table:

*Average relative humidity and departures from the normal.*

| Districts. | Average. | Departure from the normal. | Districts. | Average. | Departure from the normal. |
|---|---|---|---|---|---|
| | % | | | % | |
| New England | 76 | 0 | Missouri Valley | 76 | + 1 |
| Middle Atlantic | 74 | — 2 | Northern Slope | 75 | + 5 |
| South Atlantic | 79 | + 2 | Middle Slope | 66 | — 1 |
| Florida Peninsula | 84 | + 3 | Southern Slope | 64 | — 2 |
| East Gulf | 75 | — 3 | Southern Plateau | 54 | + 4 |
| West Gulf | 71 | — 5 | Middle Plateau | 75 | + 5 |
| Ohio Valley and Tennessee | 73 | — 4 | Northern Plateau | 84 | + 4 |
| Lower Lake | 77 | — 4 | North Pacific | 88 | + 3 |
| Upper Lake | 83 | 0 | Middle Pacific | 76 | — 3 |
| North Dakota | 81 | + 1 | South Pacific | 68 | — 4 |
| Upper Mississippi Valley | 82 | + 4 | | | |

## CLEAR SKY AND CLOUDINESS.

The cloudiness for the month was below average in the west Gulf States, lower Lake region, Missouri Valley, and south Pacific region; and above the average in all other districts, except North Dakota, where it was normal.

The distribution of clear sky is graphically shown on Chart V, and the numerical values of average daylight cloudiness, both for individual stations and by geographic districts, appear in Table I.

The averages for the various districts, with departures from the normal, are shown in the following table:

*Average cloudiness and departures from the normal.*

| Districts. | Average. | Departure from the normal. | Districts. | Average. | Departure from the normal. |
|---|---|---|---|---|---|
| New England | 6.0 | + 0.2 | Missouri Valley | 5.0 | — 0.1 |
| Middle Atlantic | 6.2 | + 0.6 | Northern Slope | 5.2 | + 0.1 |
| South Atlantic | 6.0 | + 0.7 | Middle Slope | 4.2 | + 0.4 |
| Florida Peninsula | 6.2 | + 1.4 | Southern Slope | 4.2 | + 0.4 |
| East Gulf | 6.1 | + 0.5 | Southern Plateau | 3.8 | + 0.7 |
| West Gulf | 4.6 | — 0.7 | Middle Plateau | 5.5 | + 1.4 |
| Ohio Valley and Tennessee | 6.5 | + 0.1 | Northern Plateau | 7.6 | + 0.1 |
| Lower Lake | 7.2 | — 0.3 | North Pacific | 8.5 | + 1.0 |
| Upper Lake | 7.2 | + 0.4 | Middle Pacific | 5.8 | + 0.7 |
| North Dakota | 4.7 | 0.0 | South Pacific | 3.7 | — 0.4 |
| Upper Mississippi Valley | 6.1 | + 0.8 | | | |

# DESCRIPTION OF TABLES AND CHARTS.

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Table I gives the data ordinarily needed for climatological studies for about 145 Weather Bureau stations making simultaneous observations at 8 a. m. and 8 p. m., seventy-fifth meridian time daily, and for about 42 others making only one observation. The altitudes of the instruments above ground are also given.

Table II gives, for about 2800 stations occupied by cooperative observers, the absolute maximum and minimum temperatures of the month, the mean temperature deduced from the average of all the daily maxima and minima, or other readings, as indicated by the numeral following the name of the station, the total monthly precipitation, and the total depth in inches of any snow that may have fallen. When it is possible that there may have been snow of which no record has been made, that fact is indicated by leaders, thus (. . . .).

Table III gives, for all stations that make observations at 8 a. m. and 8 p. m., the four component directions and the direction resultants of the wind based on these two observations only and without considering the velocity. The total movement for the whole month is given for each station in Table I.

Table IV gives a record of rains whose intensity at some period of the storm's continuance equaled or exceeded the following rates:

| Duration, minutes | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 80 | 100 | 120 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rates per hour (inches) | 3.00 | 1.80 | 1.40 | 1.20 | 1.08 | 1.00 | 0.94 | 0.90 | 0.86 | 0.84 | 0.75 | 0.60 | 0.54 | 0.50 |

In cases where no storm of sufficient intensity to entitle it to a place in the full table has occurred, the greatest rainfall of any single storm has been given, also the greatest hourly fall during that storm.

Table V gives, for about 30 stations of the Canadian Meteorological Service, the means of pressure and temperature, total precipitation and depth of snowfall, and the respective departures from normal values, except in the case of snowfall.

Table VI gives the heights of rivers referred to zeros of gages.

Chart I.—Hydrographs for seven principal rivers of the United States.

Chart II, tracks of centers of high areas, and Chart III, tracks of centers of low areas. The roman numerals show number and chronological order of the centers. The figures within the circles show the days of the month; the letters *a* and *p* indi-